

# CLAIMS

1. A rubber composition for a tire tread comprising 10-250 parts by weight of a carbon black per 100 parts by weight of a rubber component, in which the said carbon black is produced in a carbon black production step using a production furnace wherein a combustion zone, a reaction zone and a reaction stop zone are coaxially connected to each other and including a step of producing a high-temperature combustion gas through the combustion of hydrocarbon fuel in the combustion zone, a step of spraying a starting hydrocarbon into the high-temperature combustion gas flow in the reaction zone to convert the starting hydrocarbon into carbon black through partial combustion or thermal decomposition reaction and a step of quenching the high-temperature combustion gas flow with a quenching medium in the reaction stop zone to complete the reaction, under conditions satisfying the following relational equations (1) and (2):

15 
$$2.00 \leq \alpha \leq 9.00 \dots (1)$$

$$-2.5 \times \alpha + 85.0 \leq \beta \leq 90.0 \dots (2)$$

when a residence time from the introduction of the starting hydrocarbon into the high-temperature combustion gas flow to the introduction of the quenching medium is  $t_1$  (sec), an average reaction temperature for such a time is  $T_1$  ( $^{\circ}\text{C}$ ), a residence time from the introduction of the quenching medium to the enter of a reaction gas flow into the reaction stop zone is  $t_2$  (sec), an average reaction temperature for such a time is  $T_2$  ( $^{\circ}\text{C}$ ),  $\alpha = t_1 \times T_1$  and  $\beta = t_2 \times T_2$ .

2. A rubber composition for a tire tread according to claim 1, which is compounded with the carbon black produced in the carbon black production step that the  $\alpha$  value and the  $\beta$  value satisfy the following relational equations (3) and (4):

25 
$$3.00 \leq \alpha \leq 8.00 \dots (3)$$

$$-2.5 \times \alpha + 85.0 \leq \beta \leq 86.0 \dots (4)$$

3. A rubber composition for a tire tread according to claim 1 or 2, which is compounded with the carbon black produced in the carbon black production step further comprising a step of introducing a gaseous body in the reaction zone or the reaction stop zone.

4. A rubber composition for a tire tread according to any one of

claims 1-3, which is compounded with the carbon black having a dibutyl phthalate absorption (DBP) of 40-250 ml/100 g, a compressed DBP absorption (24M4DBP) of 35-220 ml/g and a cetyltrimethylammonium bromide adsorption specific surface area (CTAB) of 70-200 m<sup>2</sup>/g.

5                    5. A rubber composition for a tire tread according to claim 4, which is compounded with the carbon black having a dibutyl phthalate absorption (DBP) of 95-220 ml/100 g and a compressed DBP absorption (24M4DBP) of 90-200 ml/g.

10                   6. A rubber composition for a tire tread according to claim 4 or 5, which is compounded with the carbon black having a tinting strength (TINT) > 0.363xCTAB+71.792.

7. A rubber composition for a tire tread according to claim 4 or 5, which is compounded with the carbon black having a tinting strength (TINT) < 0.363xCTAB+71.792 and (TINT) > 50.

15                   8. A rubber composition for a tire tread according to any one of claims 1 to 7, which is compounded with the carbon black having a hydrogen desorption ratio > 0.260-6.25x10<sup>-4</sup>xCATB (wt%).

20                   9. A rubber composition for a tire tread according to any one of claims 1 to 8, which is compounded with the carbon black having a toluene tinting permeability of not less than 90%.

10. A rubber composition for a tire tread according to any one of claims 1 to 8, which is compounded with the carbon black having an extraction amount with monochlorobenzene of not more than 0.15%.

25                   11. A pneumatic tire characterized by using a rubber composition for a tire tread as claimed in any one of claims 1 to 10 in a tread portion.